TS3 Series

Micro low power Hall effect joystick

MAIN FEATURES

- 14mm x 12mm package size above panel
- Hall effect technology
- 3.3V operating voltage
- IP67 above panel sealing
- 2.5 million lifecycles
- Made in the USA

The TS3 Series is the world's smallest low power industrial Joystick. Featuring 3.3V Hall effect architecture for energy efficient long life performance, the TS3 Series is ideal for battery powered applications including UAV and UGV remote controls. Constructed with an M8 x 1mm threaded body to provide IP67 above panel sealing, this micro joystick's optimized design offers proportional control in a total package size measuring 0.81" x 0.55".

SPECIFICATIONS*

MECHANICAL (X & Y AXIS)	
Angular travel:	20° total (10° each direction from center)
Expected life:	2.5 million operations
Centering:	Spring return
Mass/weight:	3 grams*
Mounting:	M8 x 1mm knurled nut

* Approximate weight. Actual weight dependent on configuration
** Measured 0.42" above panel surface

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SPECIFICATIONS

ELECTRICAL	
Technology:	Hall effect sensor, single
Resolution:	8 bit, 256 counts 0 to 255
Supply voltage:	3.3VDC +/- 0.3VDC regulated transient free
Electrical output:	SPI
Current consumption:	8mA typical running
Sleep mode consumption:	150uA typical after 2 sec idle

ENVIRONMENTAL	
Operating temperature:	-40°C +85°C
Storage temperature:	-50°C +125°C
Above panel sealing:	IP67*
EMC immunity level:	EN61000-4-3 *compliance to 30A/m
EMC emissions level:	EN61000-6-3
ESD immunity level:	EN61000-4-2 *compliance to +/-15kV/+/-8kV

* Above panel sealing. All configurations. Product is idle and not in use.
** Extended testing levels

MATERIALS	
Plastic housing:	Mineral & glass filled nylon
Boots & actuators:	Silicone (with tear resistant additive) & glass filled nylon

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SPECIFICATIONS

SPI SPECIFICATION	
SPI Joystick Commands:	Get Joystick Position (CMD=1)

Write to Joystick:

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5
1	X	X	X	X

Read from Joystick:

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5
STATUS	X Lo	X Hi	Y Lo	Y Hi

SPI Joystick Commands:	Get Joystick Firmware Version (CMD=4)

Write to Joystick:

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 5	Byte 7	Byte 8	Byte 9
4	X	X	X	X	X	X	X	X

Write from Joystick:

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 5	Byte 7	Byte 8	Byte 9
STATUS	X Lo	X Hi	Y Lo	Y Hi	FW Lo	FW Hi	RSVD	RSVD

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SPECIFICATIONS

SPI SPECIFICATION (CONTINUED)	
SPI Communication Settings:	SPI Mode = 3 SCLK tested up to 100KHz SPI CS* is active low. CS* should be asserted 1.5us before each packet transfer and maintained until after the transfer is completed.

Joystick Position Data Handling

Processing Pipeline

The joystick position measurement is processed through a 3-stage synchronous pipeline, driven by host SPI transfers:

1. Start Measurement
2. Acquire Measurement and Apply Calibration
3. Post Result to Output Buffer

New position data is provided with each SPI request. However, the output corresponds to samples that have propagated through the pipeline rather than the instantaneous joystick position.

Pipeline Latency and Developer Considerations

Due to the 3-stage pipeline, developers must account for a two-cycle latency in joystick data:

- **Power-Up Behavior**
  - The first two joystick reads after power-up are undefined and must be ignored.
- **Resuming from Pause**
  - The first two reads after resuming from a pause reflect joystick positions captured before the pause began.
- **Continuous Operation**
  - During normal operation, each returned sample is delayed by two cycles relative to the actual joystick position.
  - **Example:** If queried every 10 ms, each sample corresponds to the joystick's position from 20 ms earlier.

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SPECIFICATIONS

ZIF END TERMINATION	
TRACE	**FUNCTION**
1	RESERVED
2	RESERVED
3	RESERVED
4	3.3V
5	MOSI - Host Data Out
6	SCLK
7	CS* Active Low Chip Set
8	MISO - Host Data In
9	GND
10	N/A

Rigid Flex FPC:
10 position, 0.5mm
25mm Total Length

01282026mp

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TS3 SERIES PART NUMBER CODE

TS3
Series

LIMITER OPTION	
S	SQUARE
Y	Y LIMITER

TERMINATION	
A	25MM LENGTH FPC

COLOR	
BK	BLACK

ACTUATOR	
H5	HARD PLASTIC, CASTLE
H6	HARD PLASTIC, CONVEX
H7	HARD PLASTIC, CONVEX NOTCHED
H8	HARD PLASTIC, RIBBED
H9	HARD PLASTIC, SINGLE AXIS

ELECTRICAL OUTPUT	
1	3.3V SPI

SPRING FORCE	
1	STANDARD

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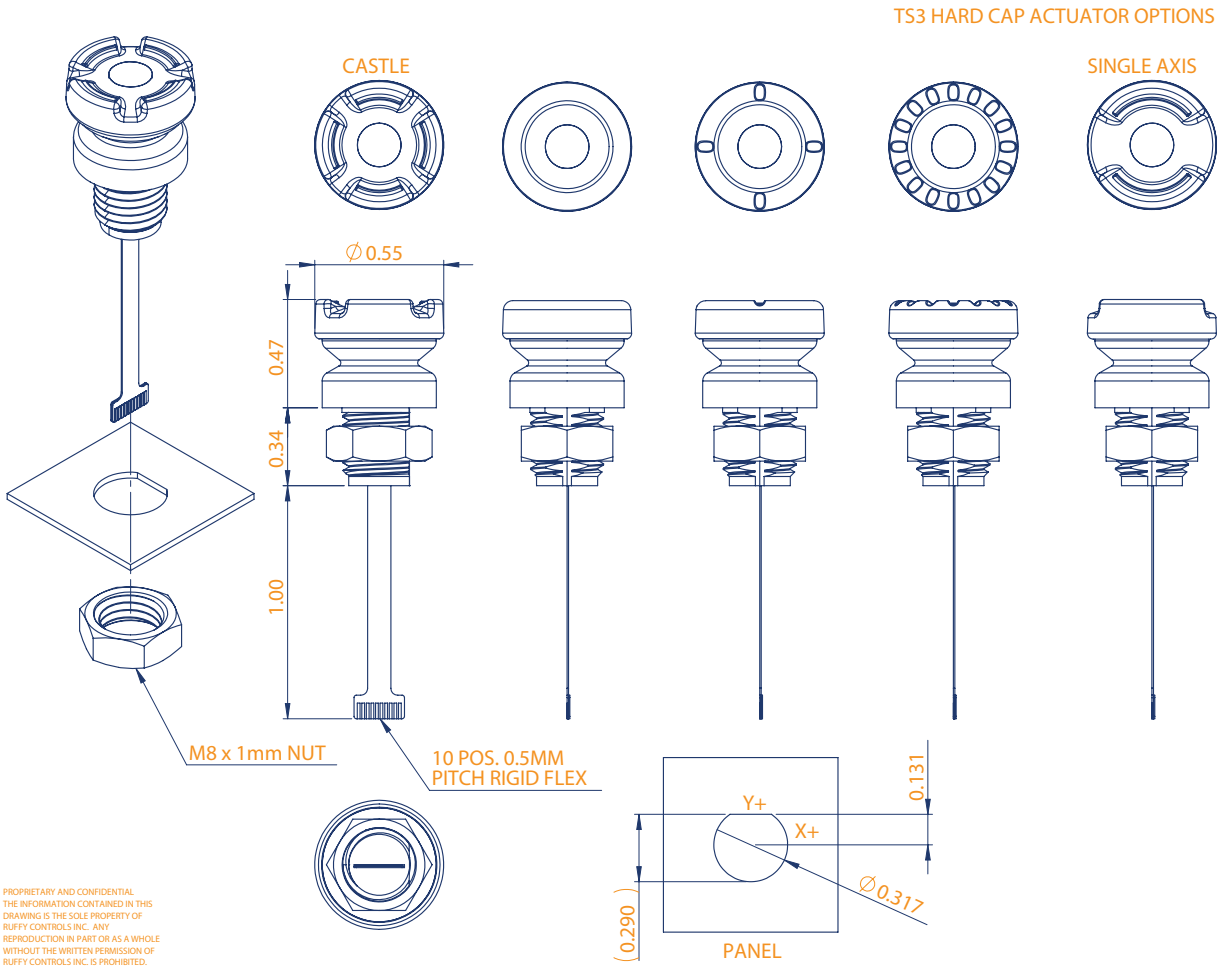
ACTUATOR OPTIONS



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